Operation analytics and investigating metrics spike

❖ Project Description:

➢ The given project consists of 2 case studies:-

- First is regarding Operation Analytics where job data is provided and the number of jobs reviewed, a 7-day rolling average of throughput, percentage share of language used, and duplicates are found.
- Second is Investigating Metric Spikes where user engagement, user growth, weekly retention, and email engagement are determined.
- The following information is found with the help of SQL queries.

❖ Approach:-

The required information was determined via SQL queries where the database was created first in SQL and moreover for the second case study due to the size of the data excel was used to make charts for better visualization.

operation analytics:-

1.Number of jobs reviewed:-

select avg(t) as 'avg jobs reviewed per day per hour',avg(p) as 'avg jobs reviewed per day per second'From(select ds,((count(job_id)*3600)/sum(time_spent)) as t,((count(job_id))/sum(time_spent)) as p from job_data where month(ds)=11 group by ds) a;

avg jobs reviewed per day per hour	avg jobs reviewed per day per second
126.1804833	0.03505

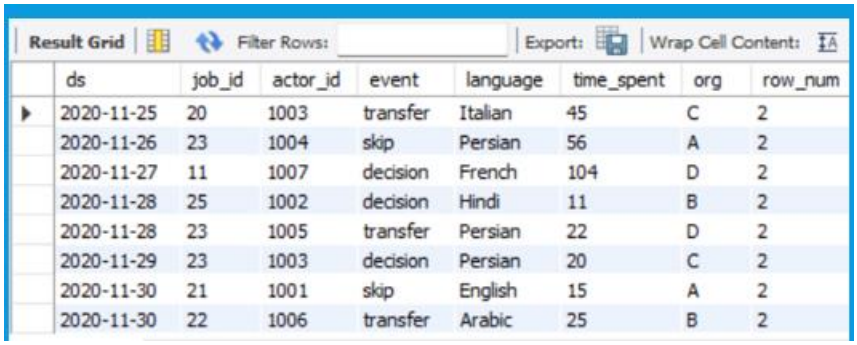
2.Throughput:-

Select ds, c/t as throuput_per_day, c7/s7 as throuput_7_day_rolling From (select ds, count(job_id) as c,sum(time_spent) as t, count(job_id) over(order by ds rows between 6 preceding and current row) as c7,sum(time_spent) over(order by ds rows between 6 preceding and current row) as s7 from job_data where month(ds)=11 group by ds) a;

ds	throuput_per_day	throuput_7_day_rolling
25-11-2020	0.0222	0.0222
26-11-2020	0.0179	0.0198
27-11-2020	0.0096	0.0146
28-11-2020	0.0606	0.0176
29-11-2020	0.05	0.0202
30-11-2020	0.05	0.0229

3.Finding duplicates:-

select * from(select *,row_number() over(partition by ds,actor_id,job_id) as row_num from job_data) a where row_num>1;



ds	job_id	actor_id	event	language	time_spent	org	row_num
2020-11-25	20	1003	transfer	Italian	45	C	2
2020-11-26	23	1004	skip	Persian	56	A	2
2020-11-27	11	1007	decision	French	104	D	2
2020-11-28	25	1002	decision	Hindi	11	B	2
2020-11-28	23	1005	transfer	Persian	22	D	2
2020-11-29	23	1003	decision	Persian	20	C	2
2020-11-30	21	1001	skip	English	15	A	2
2020-11-30	22	1006	transfer	Arabic	25	B	2

4.Percentage share of language used in last 30 days:-

select language , num_jobs, OperatiOn analytics and investigating metrics spike 100.0*num_jobs/total_jobs as pct_share_jobs From (Select language,count(distinct job_id)as num_jobs From job_data Group by language)a

Cross join (select count(distinct job_id) as total_jobs From job_data)b;

language	percentage
Italian	12.5
Persian	37.5
French	12.5
Hindi	12.5
Arabic	12.5
English	12.5

- **Investigating Metric Spike Approach:-**

1.Weekly user engagement:-

select *, engagement-lag(engagement) over(partition by'week of the year') as 'weekly engagement growth' From (select week(occurred_at) as 'week of the year', count(event_name) as 'engagement' from events where event_type!='signup_flow' group by week(occurred_at))a;

week of the year	engagement	weekly engagement growth
17	8019	NULL
18	17341	9322
19	17224	-117
20	17911	687
21	17151	-760
23	18280	1129
22	18413	133
24	19052	639
25	18642	-410
29	20067	1425
26	19061	-1006
30	21533	2472
28	20776	-757
27	19881	-895
31	18556	-1325
32	16612	-1944
33	16145	-467
34	16127	-18
35	784	-15343

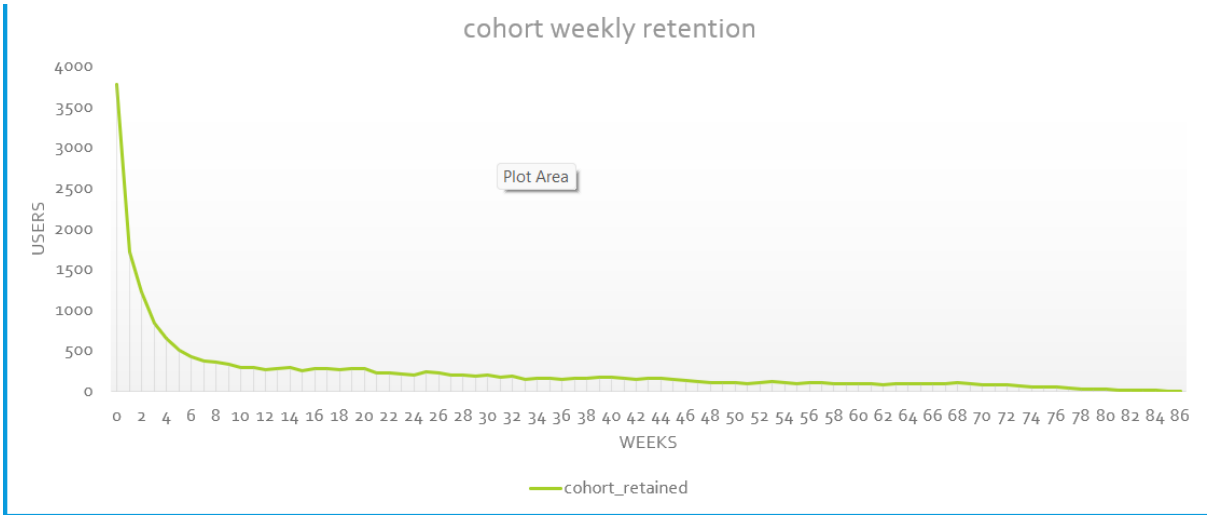
2.User growth:-

select *, new_user_activated-lag(new_user_activated) over(order by year_,quarter_) as user_growth from(select year(created_at) as year_,quarter(created_at) as quarter_,count(user_id) as new_user_activated from users where activated_at is not null and state='active' group by 1,2)a ;

year_	quarter_	new_user_activated	user_growth
2013	1	470	NULL
2013	2	608	138
2013	3	930	322
2013	4	1275	345
2014	1	1692	417
2014	2	2378	686
2014	3	2028	-350

3.Weekly retention cohort analysis:-

Select week_period, first_value(cohort_retained) over (order by week_period) as cohort_size, cohort_retained, cohort_retained / first_value(cohort_retained) over (order by week_period) as pct_retained From (select timestampdiff(week,a.activated_at,b.occurred_at) as week_period, count(distinct a.user_id) as cohort_retained From (select user_id, activated_at from users where state='active'group by 1) a inner join (select user_id,occurred_at from events)b on a.user_id=b.user_id group by 1) c;



4.Weekly engagement per device:-

Select device_name, avg(num_users_using_device) as avg_weekly_users, avg(times_device_use_current_week) as avg_times_used_weekly From (select week(occurred_at) as week, device as device_name , count(distinct user_id) as num_users_using_device, count(device) as times_device_use_current_week from events where event_name='login' group by 1,2 OperatiOn analytics and investigating metrics spike order by 1) a group by 1;

device_name	avg_weekly_users	avg_times_used_weekly
acer aspire desktop	26	32.9474
acer aspire notebook	43.1579	56.8421
amazon fire phone	10.5556	13.7778
asus chromebook	43.5263	58.8947
dell inspiron desktop	46.6316	62.7368
dell inspiron notebook	91.1053	123.4737
hp pavilion desktop	42.1053	55.8421
htc one	21.8421	27.6842
ipad air	51.4444	61.7222
ipad mini	30	34.7368
iphone 4s	46.6316	60.5789
iphone 5	123.1579	161.2105
iphone 5s	73.3158	96.7895
kindle fire	21.1579	25.5263
lenovo thinkpad	172.9474	232.5789
mac mini	20.4737	27.3684
macbook air	123.1579	164.8947
macbook pro	260.1579	358.1579
nexus 10	27.0526	31.8421
nexus 5	76.3684	99.6316
nexus 7	36.3684	43.2632
nokia lumia 635	28.1579	36.2632
samsumg galaxy tablet	10.2778	12.1111
samsung galaxy note	13.4737	17.5789
samsung galaxy s4	91.5789	118.7368
windows surface	18.2105	21.5263

5.E-mail engagement metric:-

Select week, num_users, time_weekly_digest_sent, time_weekly_digest_sent-lag(time_weekly_digest_sent) over(order by week) as time_weekly_digest_sent_growth, time_email_open,time_email_open-lag(time_email_open) over(order by week) as time_email_open_growth, time_email_clickthrough,time_email_clickthrough-lag(time_email_clickthrough) over(order by week) as time_email_clickthrough_growth From (select week(occurred_at)as week, count(distinct user_id) as num_users, sum(if(action='sent_weekly_digest',1,0)) as time_weekly_digest_sent, sum(if(action='email_open',1,0)) as time_email_open, sum(if(action='email_clickthrough',1,0)) as time_email_clickthrough from email

group by 1 order by 1) a;

week	num_users	time_weekly_digest_sent	time_weekly_digest_sent_growth	time_email_open	time_email_open_growth	time_email_clickthrough	time_email_clickthrough_growth
17	981	908	NULL	310	NULL	166	NULL
18	2714	2602	1694	912	602	430	264
19	2787	2665	63	972	60	477	47
20	2874	2733	68	1004	32	507	30
21	2926	2822	89	1014	10	443	-64
22	3029	2911	89	987	-27	488	45
23	3134	3003	92	1075	88	538	50
24	3254	3105	102	1155	80	554	16
25	3343	3207	102	1096	-59	530	-24
26	3439	3302	95	1165	69	556	26
27	3543	3399	97	1228	63	621	65
28	3641	3499	100	1250	22	599	-22
29	3734	3592	93	1219	-31	590	-9
30	3866	3706	114	1383	164	630	40
31	3950	3793	87	1351	-32	445	-185
32	4023	3897	104	1337	-14	418	-27
33	4200	4012	115	1432	95	490	72
34	4294	4111	99	1528	96	490	0
35	48	0	-4111	41	-1487	38	-452

❖ Insights:-

➢ Case Study 1 (job Data):-

▪ In November 2020, the number of different jobs reviewed per hour per day was 83%.

▪ We use a 7-day moving average throughput as it provides an average for all days from day 1 to day 7, whereas the daily metric only provides an average for a particular day itself.

▪ Persian has the highest rate (37.5%). Operation analytics and investigating metrics spike

▪ If we split the job_id, there are two duplicate rows. But if we look at all columns, each row is unique.

➢ Case Study 2 (investigated Metrics spike):

▪ All data corresponding to Day 35 should be disregarded, as this is only the first day of the week.

- A total of 9381 active users from the first week of 2013 to the 35th week of 2014.
- Average retention rate after first week 72.5%
- MacBook users and Samsung galaxy tablet users contribute with more than one device per week.

- E-mail open rate is 1117, e-mail click-through rate is around 493. People use email services that are essential for the growth of the company.

❖ Tech stack used:-

- **MySQL was used to run the queries.**
- **The language was selected because of comfort and experience in the same.**
- **MS Excel was used in the second case study for better visualization.**
- **As I am currently learning this tool, it was utilized to get more hands-on experience.**

❖ Result:-

Really engaging project, the difficulty of the project makes it more fulfilling to execute. Learned a lot of new things like rolling over and get cohort retention analysis.